A STRUCTURAL APPROACH TO FINANCIAL STABILITY: ON THE BENEFICIAL ROLE OF REGULATORY GOVERNANCE

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Abstract

This paper examines whether the governance of regulatory agencies – regulatory governance – is positively related to financial sector soundness. We model regulatory governance and financial stability as latent variables, using a structural equation modeling approach. We include a broad range of variables potentially relevant to financial stability, employing aggregate regulatory, banking and financial, macroeconomic and institutional environment data for a sample of 55 countries over a period from 2001 to 2005. Given the growing importance of macro-prudential analysis, we use the IMF's financial soundness indicators, a relatively new body of economic statistics which focuses on the banking sector as a whole. Our empirical evidence indicates that regulatory governance has a beneficial influence on financial stability. Thus, our findings support the view that the improvement of regulatory governance arrangements should be a building block of financial reform***.

Keywords: Financial Stability, Regulatory Governance, Regulatory Authorities, Banking Sector

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1 Introduction

The literature claims that good regulatory governance enhances the ability of the financial system to withstand unsound market practices and the occurrence of moral hazard and hence improves system-wide risk management capabilities, whereas dysfunctional government arrangements are supposed to undermine the credibility of the regulatory authority and lead to the spread of unsound practices, jeopardizing the stability of the financial system (Das et al., 2004). Quintyn (2007) argues that weak regulatory governance promotes weak financial sector governance in general, which in turn impairs the smooth functioning of the financial system, curbing economic performance and growth. The Basel Committee on Banking Supervision (1997; 2006) has recognized the importance of independence and accountability for regulatory authorities by including these two governance arrangements in the Basel Core Principles for Effective Banking Supervision (BCP).

This paper is motivated by the fact that many regulatory authorities lacked the mandate, sufficient resources and independence to effectively contain systemic risk and to implement early action in the run-up to the recent financial crisis (see, e.g., Claessens et al., 2010). Many commentators view governance failures as a key contributing factor to the global financial crisis. The evidence provided by Levine (2010) indicates that regulatory agencies apparently were aware of the build-up of risk in the financial sector associated with their policies, but chose not to modify those policies. Mian et al. (2010) lend support to this finding by showing that vested interests influenced the financial sector policy-making of the US government in the wake of the financial crisis. Igan et al. (2009) find that financial institutions which lobbied more intensely originated mortgages with higher loan-to-income ratios, securitized more intensively and had faster growing mortgage loan portfolios.

The aim of this paper is to investigate the influence of regulatory governance on financial stability, taking into account a broad range of control variables. So far, the evidence on the impact of regulatory governance on financial stability is rather inconclusive (see Quintyn, 2007; Mohr and Wagner, 2012). We model financial stability and the governance of regulatory authorities as latent variables, using a structural equation modeling approach. The objective of our empirical analysis is twofold: first, to test whether the data patterns can be fitted within the data sample and second, to provide cross-country evidence on the relationship between regulatory governance and financial stability.

This methodological approach is basically motivated by three aspects (also see Borio, 2004; Mohr and Wagner, 2012). First, it is not entirely clear what constitutes a good regulatory framework that promotes bank development, efficiency, and stability. Second, due to a lack of theoretical guidance, any construction of an index that tries to capture regulatory governance arrangements relies on some degree of judgment. Evidently, this is reflected in the wide range of different proxies used for capturing regulatory governance. Most importantly, because there is no widely accepted measure, quantification or time series for measuring financial stability (see, e.g., Segoviano and Goodhart, 2009), similar difficulties relate to the variable that should proxy financial stability.

We think that our approach has several advantages over methods used in the existing literature (see section 2). A structural equation model can provide information about the relationship between variables which have causes and effects that are observable but which cannot themselves be directly measured or are difficult to measure, respectively (see, e.g., Breusch, 2005). Furthermore, global fit measures can provide a summary evaluation of complex models that involve a large number of linear equations. Other methodologies like multiple regressions would provide only separate "mini-tests" of model components conducted on an equation-by-equation basis (Tomarken and Waller, 2005). Most importantly, the structural equation modeling methodology allows for a number of indicators reflecting different dimensions of multidimensional variables such as financial stability or regulatory governance, enabling a better estimation. By this we avoid the problem of choosing appropriate weights, a problem typically encountered when using aggregate measures or composite indicators.

The contribution to the related literature is three-fold: to our knowledge, we are the first to model regulatory governance and financial stability as latent variables, using a structural equation modeling approach. Furthermore, we investigate the relationship between regulatory governance and financial stability by using the IMF's financial soundness indicators – a relatively new body of economic statistics. Finally, we consider a broader range of indicators capturing regulatory governance or aspects thereof.

The remainder of this paper is structured as follows. Section 2 sets the stage by giving a short review of the related literature. Sections 3 describes the data and variables, section 4 introduces the empirical methodology. Section 5 presents the empirical results and section 6 concludes.

2 Related literature

The increasing popularity of regulatory governance as an economic concept can be attributed to financial liberalization and recent banking crises that have brought the discussion about the appropriate institutional framework for regulatory agencies to the forefront (Goodhart, 2007). Goodhart (1998) as well as Das and Quintyn (2002) were among the first to emphasize the governance dimension of banking regulation. The theoretical literature advocates that regulatory and supervisory independence from the government and the financial industry is essential for the achievement and preservation of financial stability. Since regulatory authorities exercise important powers with distributional consequences they are subject to pressures from the financial sector and political interference (see, e.g., Quintyn and Taylor, 2003). Furthermore, the involved interest groups – the regulatee (financial industry), politicians and regulatory agency officials – interact to maximize their ability to extract rents from economic activity (see Shleifer and Vishny, 1998). However, to make the independence of regulatory authorities work, it has to be accompanied by accountability arrangements (see, e.g., Hüpkes et al., 2005).

Anecdotal evidence indicates that insufficient banking regulation, weaknesses in supervision, government intervention in the regulatory process and connected lending play a central role in the explanation of banking crises during the last decades (see, e.g., Caprio and Klingebiel, 1997; Lindgren et al., 1999). Rochet (2008) argues that many recent crises were largely amplified or even provoked by political interference, while the key to successful financial reform lies in ensuring the independence and accountability of regulatory authorities. According to Barth et al. (2003), there are particularly three common practices that undermine regulatory governance. First, credit granted due to directed lending might not be justified under safe banking standards because it is more likely that it turns out to be non-performing. Such practices could undermine the credibility of the regulatory authority and the development of a sound loan base and consequently restrict economic growth. Second, government ownership of banks could threaten the stability of the banking system in a similar vein since the regulatory authority might not be allowed to apply regulatory standards to state-owned banks. Finally, the protection of weak regulations by politicians and government-

encouraged regulatory forbearance are the most common types of undermining the integrity of the regulatory authority and exacerbating financial crises.

The empirical evidence on the impact of regulatory governance on financial stability is rather inconclusive. There is a broad division into two camps: while some studies support the claim of a positive relationship between regulatory governance and financial stability, the other strand of the empirical literature does not find that financial stability is related to regulatory governance or aspects thereof.

Recent research finding a positive influence of regulatory governance on financial stability includes Beck et al. (2003), Das et al. (2004) and Ponce (2009). Beck et al. (2003) investigate the impact of different regulatory policies on the integrity of bank lending. Using the World Business Environment Survey, they approach the concept of financial stability by asking to which degree firms face obstacles in obtaining external finance. The results of their ordered probit regression show that a higher degree of regulatory independence seems to reduce the likelihood that politicians or the financial industry will capture the agency. Das et al. (2004) construct an index of regulatory governance based on the IMF's Financial Sector Assessment Program (FSAP). Banking sector stability is proxied by an index consisting of a weighted average of the capital adequacy ratio and the ratio of non-performing loans. Using a weighted least squares approach, their results suggest that regulatory governance has a positive impact on the stability of the banking sector. Ponce (2009) also uses data collected by the FSAP to capture regulatory governance arrangements but only uses the ratio of non-performing loans to proxy financial stability. The main findings of his linear regression are that regulatory independence significantly reduces the average probability of banks' loan default, and that legal protection and accountability seem to be of even more importance.

The second strand of empirical literature does not find that regulatory governance is associated with financial stability and comprises the work of Barth et al. (2004; 2006) as well as Demirgüc-Kunt et al. (2008) and Demirgüc-Kunt and Detragiache (2010). By running OLS and ordered probit regressions, Barth et al. (2004; 2006) conduct a comprehensive study on the impact of regulatory practices on the development, efficiency and stability of the banking sector as well as the occurrence of a banking crisis. Similar to Beck et al. (2003), the authors do not estimate the influence of regulatory governance directly. Instead, they test the validity of two contrasting approaches to bank regulation – the public and the private interest approach to regulation – by examining an extensive array of regulations and supervisory practices. In sum, their findings provide no support for greater official supervisory powers. Furthermore, supervisory independence is not related to bank development, efficiency and stability. Demirgüc-Kunt et al. (2008) also employ an OLS and ordered probit approach. Using Moody's Financial Strength Rating as a proxy for the soundness of the banking sector, their results indicate that the positive relationship between bank ratings and the compliance with the BCP is rather weak. Demirgüc-Kunt and Detragiache (2010) extend this work by utilizing the z-score instead of Moody's rating. The results are obtained by performing OLS regressions. However, they fail to find a relationship between bank soundness and BCP compliance.

Empirical studies that use an empirical approach that is similar to ours, but are concerned with a different research agenda are Giles and Tedds (2002) or Bajada and Schneider (2005). These studies employ a structural equation modeling approach for estimating the size and development of the shadow economy or for testing the statistical relationships between the shadow economy and other economic variables. Other studies treat corruption as a latent variable that is directly related to its underlying causes (Dreher et al., 2007). Only a small body of empirical literature has approached aspects of financial stability by using the structural equation modeling technique. Rose and Spiegel (2009; 2010; 2011) treat the recent financial crisis as a latent variable. They model the crisis as a combination of changes in real GDP, the stock market, country credit ratings and the exchange rate, simultaneously linking potential indicators of a financial crisis with potential causes of the crisis.

3 Determinants of financial stability: data and variables

3.1 Financial stability

Although academics and policy-makers have provided various definitions, financial stability still remains an elusive concept. So far, there is no consensus on what best describes the state of financial stability. Due to the interdependencies of different elements within a financial system as well as with the real economy, financial stability is a difficult concept to define (see Dattels et al., 2010). Accordingly, there is no uniformly accepted definition of financial stability (for a survey see, e.g., Schinasi, 2006).

In this paper, we will take a systemic view that emphasizes the resilience of the financial system (as a whole) to financial or real shocks so that it can perform its ability to facilitate and support the efficient functioning and performance of the economy. Thus, we adhere to Mishkin (1999, p.6) who argues that financial instability occurs "when shocks to the financial system interfere with information flows so that the financial system can no longer do its job of channeling funds to those with productive investment opportunities". Following Schinasi (2006, p. 83), a "financial system is in a range of stability whenever it is capable of facilitating (…) the performance of an economy, and of dissipating financial imbalances that

arise endogenously or as a result of significant adverse and unanticipated events".

Reflecting the difficulties in defining financial stability, the measurement of financial stability poses significant challenges since there is no widely accepted set of measurable indicators that can be monitored and assessed over time (see ECB, 2005; Cihák and Schaeck, 2010). To capture financial stability, the empirical literature has relied on three broad categories of indicators (also see Das et al., 2004 or Borio and Drehmann, 2009). The first strand of literature has employed banking crisis indicators based on certain dating schemes that identify whether an economy experienced a crisis event during a certain period of time. Studies that use banking crisis indicators utilize dummy variables to indicate whether a crisis has occurred or not (see Boyd et al., 2009).

A second strand uses single variables as proxies for financial stability. This category contains balance sheet items from financial institutions, comprising statistics based on the CAMELS-variables – e.g. measures of financial institutions' capitalization or non-performing loans. Ratings like Moody's financial strength rating also fall into this category. Another group of indicators is based on market prices. These include measures such as volatilities and quality spreads. More sophisticated indicators built from market prices employ prices of fixed income securities and equities to derive probabilities of default in individual financial institutions, loss given default in financial institutions or the correlation of defaults across institutions (see Cihák, 2007; Borio and Drehmann, 2009).

A third strand of empirical studies makes use of so called composite indicators of financial stress. After selecting relevant variables which are often based on the early warning indicator literature, the single aggregate measure is calculated as a weighted average of the variables identified (Gadanecz and Jayaram, 2009). Such indicators typically cover risk spreads, measures of market liquidity, the banking sector as well as the foreign exchange and equity market.

Needless to say, each of the procedures carries its merits and shortcomings (see Borio and Drehmann, 2009 for a thorough evaluation). In line with the proposed definition of financial stability, we use the financial soundness indicators (FSIs) developed and disseminated by the International Monetary Fund which can be regarded as belonging to the second strand of financial stability indicators.[1] The FSIs represent a relatively new body of economic statistics to assess the state of financial systems. Accordingly, the FSIs have not been extensively analyzed empirically. The fact the FSIs are considered as rather backward looking (see, e.g., IMF, 2009) is of minor importance to us since we are interested in a cross-country exercise and not the early warning ability in order to forecast future financial vulnerabilities. The most important features of the FSIs are (i) the international comparability for a wide range of economies and country groupings and (ii) the measurement of the soundness of the financial system as a whole. These are the two chief attractions of the FSIs to us. The Guide (IMF, 2006) provides guidance on the concepts and definitions and serves as a guideline for sources and techniques for the compilation and dissemination of financial stability indicators. Consequently, the FSIs should be largely consistent and comparable on a cross-country basis. Of equal importance, the FSIs are designed to measure the stability of the financial system as a whole rather than the soundness of the individual financial institutions. The positions and flows between units within a group of financial institutions and between reporting financial institutions within the sector are eliminated. Hence, the FSIs do not represent simple aggregations or averages of financial institutions' data and differ considerably from most indicators used to proxy financial sector soundness in the relevant literature (Agresti et al, 2008). To date, the only comparable body of statistical data that is collected in an equally systematic manner is the set of macro-prudential indictors (MPIs) developed by the ECB (see Mörtinnen et al., 2005). However, the primary geographical scope of the MPIs is the Euro area and the European Union so that they are not suited for our purposes as we want to base our empirical analysis on a highly diversified country sample – both from a geographical and a development point of view.

Based on the difficulties in defining and measuring financial stability outlined above, we introduce the latent variable financial stability (*finstab*) which we are trying to capture by a range of indicator variables. We include 6 FSIs as observable indicator variables for 55 countries for the period between 2001 and 2005. The data sources and definitions are listed in table A.1 in the appendix; the country sample is given in table A.2. In order to obtain a sufficiently large sample, we mainly include FSIs from the FSI core set: Regulatory capital to risk-weighted assets (*regcap*), Bank provisions to non-performing loans (*provtonpl*), Return on assets (*roa*), Return on equity (*roe*) and Non-performing loans to total loans (*npltotloan*). Additionally, we include the bank capital to assets ratio (*capass*) from the encouraged set.

The data selection and the time frame are mainly driven by considerations of data availability. However, three qualifications are necessary. First, although the current set of FSIs is available for over

[1] Against the background of the Asian crisis, there was a need for better and internationally comparable data to monitor vulnerabilities of financial systems so that the IMF started a project to define financial soundness indicators in 1999, which were designed to monitor the soundness of financial institutions and markets as well as the corporate and household sector. In 2004 the IMF finalized the list of FSIs and published a compilation guide that laid out the definitions of the FSIs for macro-prudential analysis (San Jose and Georgiou, 2009).

100 developed and developing economies, the country selection is primarily dictated by the availability of regulatory governance variables, to be discussed hereafter. Since research on regulatory governance is still in its early stages, some indices on independence and accountability of regulatory agencies are only available for a relatively small number of countries (see, e.g., Masciandaro et al., 2008). As a result, even countries like the USA had to be omitted from the dataset.

Second, while we acknowledge that the international financial system was severely affected by the financial crisis that caused havoc on global credit and capital markets, it is precisely for this reason that we do not account for the period after 2005. Hence, the purpose for the cut-off point is to avoid structural breaks in the data. Otherwise, we expect great deviations in the estimation results to arise, as the majority of economic and financial data may have been heavily biased by the financial turbulences during the last few years.

Finally, while the IMF's core indicators only cover the deposit-taking sector, this does not pose a problem for the purpose of our empirical analysis. Although there is a trend to more arm's length financing (see, e.g., Rajan, 2006), banks are still the main collectors of funds from and providers of finance to the corporate and household sectors (see, e.g., ECB, 2008). Furthermore, the adverse consequences of a contraction in lending on the real economy are well supported by the empirical literature (see, e.g., Lown and Morgan, 2006; Bayoumi and Melander, 2008) and the relationship between crises and recessions is subject of a sizable literature (e.g., Dell'Ariccia et al., 2008). Recent studies indicate that financial crises characterized by banking sector distress are more likely to be associated with severe and protracted downturns than financial turbulences originating from securities or foreign exchange markets (see, e.g., IMF, 2008).[2]

3.2 Regulatory governance

As it is the case with financial stability, the governance of regulatory authorities is an economic concept that consists of different dimensions and is difficult to measure. We introduce the latent variable regulatory governance (*reggov*) which we are trying to capture by a range of indices used in the relevant literature. We can only draw upon one value per variable because the most of the data were collected through surveys of government officials. However, no other dataset has the level of cross-country detail on bank regulations (for additional defenses see Beck et al., 2007). The data sources and definitions for all following variables are listed in table A.1 in the appendix.

To begin with, we include several indicator variables that proxy the independence and accountability of regulatory authorities. Building on the pioneering work of Barth et al. (2004; 2006) we construct an indicator that indicates the degree of independence and accountability (*indac*). Furthermore, we build an indicator that reflects the degree to which regulatory agencies can demand financial institutions to disclose accurate information and induce private sector monitoring (*seaudit*). Such external audits represent means of an independent validation of regulatory information. A certain amount of transparency in the rule-making process and mechanisms for consultation with all parties involved can reduce the danger of regulatory capture and limit self-interests of regulators (Quintyn and Taylor, 2003). Higher values indicate a higher degree of independence and accountability and a higher intensity of external audit, respectively. Furthermore, we include two indices taken from Masciandaro et al. (2008) that capture the degree of independence (*supind*) and accountability (*supacc*). Again, higher values indicate a higher degree of independence and accountability, respectively.

Finally, we consider two variables that reflect the degree of central bank independence. This is basically motivated by the fact that many central banks play a key role in the regulation and supervision of the banking system – particularly in emerging and developing countries. Entrusting banking regulation to the central bank can be considered as reasonable if one assumes that locating regulatory and supervisory functions inside the central bank allows regulatory authorities to "piggyback" and enjoy the same degree of autonomy (Arnone et al., 2009). Furthermore, there is some evidence that central bank independence is positively related to financial stability (see, e.g., Klomp and De Haan, 2009). We use the data on political central bank independence (*cbpol*) and economic central bank independence (*cbeco*) for 2003, collected by Arnone et al. (2009).

While this paper focuses on the relationship between financial stability and regulatory governance, a substantial amount of literature suggests that the state of financial stability is determined by a plethora of variables.[3] In what follows, we also consider the structure of the banking sector, macroeconomic conditions and economic freedom as latent variables, to warrant the robustness of our empirical exercise.

[2] As our financial stability indicators only cover the banking sector, we will use the terms "financial stability" and "banking sector stability" interchangeably.

[3] See, e.g., Caprio and Klingebiel (1997), Demirgüc-Kunt and Detragiache (1998; 2005), Kaminsky and Reinhart (1999); Bordo et al. (2001), Breuer (2004), Laeven and Valencia (2008), Reinhart and Rogoff (2009), Frankel and Saravelos (2010).

3.3 Structure of banking sector

In addition to regulatory governance, we augment our structural equation model by including the structure of the banking sector (*bankstruc*) as a latent variable, under which we subsume indicator variables for the openness, competitiveness and ownership structure of the banking sector. Bank concentration (*bnkconc*) measures the share of banking system assets held by the three largest banks in an economy. A higher degree of consolidation could lead to less competition, higher profits and hence higher capital buffers. Furthermore, concentrated banking systems have larger banks with more diversified portfolios. On the other hand, a less competitive environment might involve higher risk-taking incentives and too-big-to-fail policies (Beck et al., 2007). The empirical evidence regarding the effects of a higher degree of banking concentration on the fragility of the banking sector is ambiguous (see, e.g., Uhde and Heimeshoff, 2009 for a summary of the findings).

We include the variable foreign bank competition (*forcomp*) to proxy the foreign share of the banking sector assets as well as the degree of foreign bank entry. Although foreign-owned banks hit by an adverse shock might reduce their cross border-lending, leading to a withdrawal of capital (Cetorelli and Goldberg, 2010), an overwhelming body of evidence indicates that greater openness to foreign banks improves the soundness of the banking sector by transferring best practices, increasing credit supply and putting competitive pressure on domestic banks (see, e.g., Claessens et al., 2001; Bonin et al., 2005; Clarke et al., 2006). Ownership of banks (*bankown*) measures the share of bank deposits held in privately owned banks. While theoretically disputed, most empirical studies tend to support the view that a high level of state ownership involves substantial costs in terms of depressed living standards, capital misallocation and banking fragility (see Morck et al., 2009 for an overview).

Finally, we include Restrictiveness of Bank Activities (*restrict*), a widely used measure to indicate the degree to which banks are allowed to engage in securities, insurance and real estate markets. While the theoretical discussion centers around aspects of risk diversification, economies of scale and scope, and too-big-to-fail considerations (see, e.g., Claessens and Klingebiel, 2001), the empirical literature finds that a higher degree of restrictiveness has negative repercussions in form of a higher crisis probability (Beck et al., 2007) and lower banking efficiency (Barth et al., 2004; 2006).

3.4 Macroeconomic conditions

The fourth latent variable we consider is what we call macroeconomic conditions (*macrocond*). A wave of empirical studies has analyzed the macroeconomic determinants of banking sector stability and banking crises. There is a broad consensus regarding the detrimental effects of adverse macroeconomic conditions on the stability of the banking sector (see, e.g., Von Hagen and Ho, 2007; Frankel and Saravelos, 2010).

We begin with macroeconomic variables considered in, e.g., Demirgüc-Kunt and Detragiache (1998) or Duttagupta and Cashin (2011): the rate of inflation (*gdpdefl*), the real interest rate (*realint*), GDP growth (*gdpgr*) and the fiscal balance (*fisbal*). In principle, higher rates of inflation and real interest rates as well as a weak GDP growth and fiscal position raise the likelihood of banking crises (see, e.g., Demirgüc-Kunt and Detragiache, 1998; Hardy and Pazarbasioglu, 1999). Since Caprio and Klingebiel (1997) find that a higher crisis probability is related to a higher volatility of output growth, we also consider GDP growth volatility (*gdpvol*).

Taking into account that rapid credit and money growth can lead to serious asset price misalignments and financial imbalances (Schularick and Taylor, 2009), we include credit growth (*credgr*) and money growth (*money*). Further indicator variables we consider are the deposit rate (*deprate*) and deposit rate volatility (*depvola*). Rojas-Suarez (2001) argues that low deposit rates reflect higher risk-taking behavior in the banking sector. Moreover, higher volatility of short-term interest rates can lead to fluctuations in the cost of servicing short-term liabilities and higher liquidity risk. Correspondingly, the risk of bank failures rises due to unanticipated sharp increases in short-term interest rates (Smith and Van Egteren, 2005).

Finally, we include an indicator variable to capture the degree of financial openness (*chinnito*). As a measure for financial openness, we choose the de jure-index taken from Chinn and Ito (2008) which consists of four binary dummy variables that indicate the presence of multiple exchange rates, restrictions on current account transactions, restrictions on capital account transactions and the requirement of the surrender of export proceeds. In theory, financial liberalization has both its merits and drawbacks (Calderon and Kubota, 2009 summarize the arguments). The empirical question of whether financial openness stabilizes or destabilizes the banking system is still open to debate (see, e.g., Reinhart and Rogoff, 2009; Shezad and De Haan, 2009).

3.5 Economic freedom

At last, we include the latent variable economic freedom (*ecofree*) to take account of institutional factors that might influence the soundness of the banking sector. Following Gwartney and Lawson (2003), key elements of economic freedom are personal choice, voluntary exchange, freedom to compete, and protection of persons and property. Provided that greater economic freedom enables banks

to realize greater profits and better diversify their risks, this should translate into a more stable banking sector. Institutions are regarded as consistent with economic freedom when the above mentioned components are promoted. The evidence from the empirical literature tends to support the view that weak institutions have detrimental effects on economic and financial stability (see, e.g., Demirgüc-Kunt and Detragiache, 1998).

We include the six components from the World Banks' Good Governance Indicators: voice and accountability (*vacc*), political stability (*pstab*), government effectiveness (*geff*), regulatory quality (*rqual*), rule of law (*rlaw*) and control of corruption (*ccorr*). The indicator values range from -2.5 to +2.5, with higher values corresponding to a higher institutional quality. According to the preceding discussion, we expect that higher institutional quality leads to more stable banking systems. Furthermore, we also include two indicator variables from the Database of Political Institutions. We consider political system (*system*) which shows whether an economy has an assembly-elected president, a parliamentary or a presidential system. The variable executive election (*exelec*) indicates in which year an executive election was held. Another indicator variable aiming at the quality of political institutions is democracy (*democ*) which is taken from the Polity IV database. This indicator measures characteristics from political regimes, such as the presence of procedures through which citizens can express preferences about alternative policies and leaders (Marshall et al., 2009).

We also control for government size and deposit insurance. To address government size (*govsize*) we use government consumption as a share of total consumption. Economic freedom is reduced when the government spending increases at the expense of private spending. The basic idea is that personal choice is substituted by the government decision making when the government share increases (see Gwartney and Lawson, 2003). The indicator deposit insurance scheme (*depins*) is a binary dummy variable that specifies whether an economy has implemented an explicit insurance scheme or not. The empirical evidence indicates that explicit deposit insurance tends to increase the probability of banking crises (Demirgüc-Kunt and Detragiache, 2002).

4 Empirical Methodology

A structural equation model (SEM) describes statistical relationships between latent (unobservable) variables and manifest (directly observable) variables and is typically used when variables cannot be measured directly or are difficult to measure. Sets of *manifest variables* (also called *indicator variables*) are used to capture hypothetical, difficult to measure constructs as in our case financial stability or regulatory governance. *Latent variables* are interpreted as hypothetical constructs – the "true" variables underlying the measurable indicator variables (see Rabe-Hesketh et al., 2004).

A SEM consists of two parts: the structural model and the measurement models (see Bollen, 1989 or Kline, 2011 for a detailed description of the methodology). Our structural model is given by:

$$\eta_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} & \gamma_{13} & \gamma_{14} \end{bmatrix} \cdot \begin{bmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \\ \xi_4 \end{bmatrix} + \zeta_1, \qquad (1)$$

which represents the relationship between the latent exogenous variables ($\xi_1 \ldots \xi_n$) and the latent endogenous variable (η_1). The coefficients $\gamma_{11} \ldots \gamma_{14}$ describe the relationships between the latent exogenous variables and the latent endogenous variable. Each latent variable is determined by a set of indicator variables. ζ_1 corresponds to the error term which measures the unexplained component of the structural model.

The exogenous measurement model links the exogenous latent variables to its observable indicator variables and is represented by:

$$\begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \\ x_7 \\ x_8 \\ x_9 \\ x_{10} \\ x_{11} \\ \vdots \\ x_q \end{bmatrix} = \begin{bmatrix} \lambda_{11} & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ \lambda_{31} & 0 & 0 & 0 \\ 0 & \lambda_{42} & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & \lambda_{62} & 0 & 0 \\ 0 & 0 & \lambda_{73} & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & \lambda_{93} & 0 \\ 0 & 0 & 0 & \lambda_{104} \\ 0 & 0 & 0 & 1 \\ \vdots & \vdots & \vdots & \vdots \\ 0 & 0 & 0 & \lambda_q \end{bmatrix} \cdot \begin{bmatrix} \xi_1 \\ \xi_2 \\ \xi_3 \\ \xi_4 \end{bmatrix} + \begin{bmatrix} \delta_1 \\ \delta_2 \\ \delta_3 \\ \delta_4 \\ \delta_5 \\ \delta_6 \\ \delta_7 \\ \delta_8 \\ \delta_9 \\ \delta_{10} \\ \delta_{11} \\ \vdots \\ \delta_q \end{bmatrix}, \qquad (2)$$

where $x_1 \ldots x_q$ depict the indicator variables for the exogenous latent variables. $\lambda_{11} \ldots \lambda_q$ represent the regression coefficients and the error terms are given by $\delta_1 \ldots \delta_q$. In our case the exogenous latent variables are regulatory governance, the structure of the banking sector, the macroeconomic conditions and economic freedom.

In analogy to the exogenous measurement model, the endogenous measurement model links the endogenous latent variables to its observable indicator variables. It is given by:

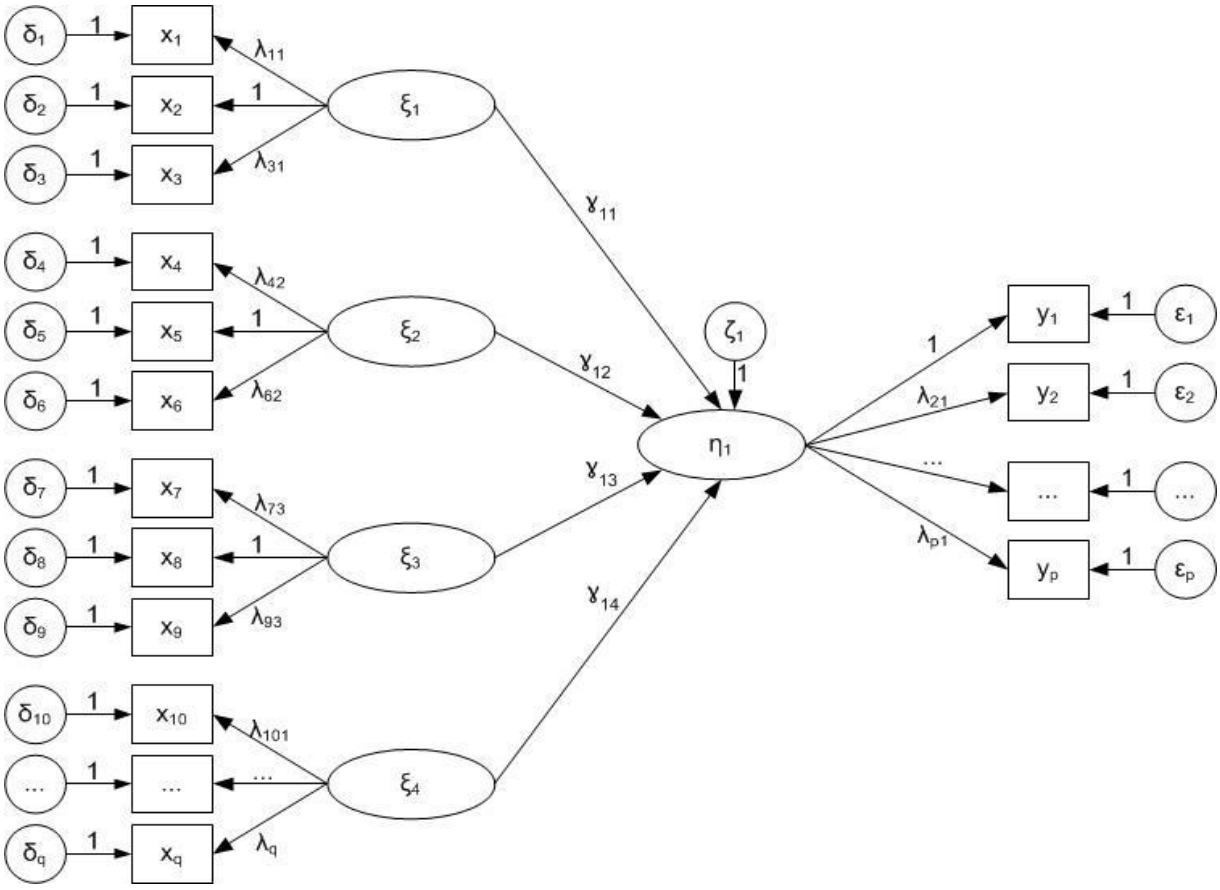
$$\begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ \vdots \\ y_p \end{bmatrix} = \begin{bmatrix} \lambda_{11} \\ 1 \\ \lambda_{31} \\ \vdots \\ \lambda_{p1} \end{bmatrix} \cdot \eta_1 + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \vdots \\ \varepsilon_p \end{bmatrix}, \quad (3)$$

where $y_1 \ldots y_p$ are the indicator variables for the endogenous latent variable financial stability (η_1). $\lambda_{11} \ldots \lambda_{p1}$ represent the regression coefficients and the error terms are given by $\varepsilon_{1 \ldots} \varepsilon_p$.

The parameters are estimated by using the information contained in the indicator variables' covariance matrices. The aim of the procedure is to obtain values for the parameters that produce an estimate for the models' covariance matrix that fits the sample covariance matrix of the indicator variables. We estimate our SEM in SPSS with AMOS. For reasons of data availability the estimation covers 55 economies for the period between 2001 and 2005. We took the mean values of the respective indicator variables from 2001 to 2005 so that we obtain one value for each indicator. Although having more observations is advisable, 55 observations per variable should be sufficient for our purposes (see, e.g., Hair et al., 2006; Tabachnick and Fidell, 2007).

Figure 1 shows the path diagram for structural equation model. The latent variables are displayed in ellipses, whereas the variables in rectangular boxes represent the indictor variables for the respective latent variables and the circles depict the error terms. Single-headed arrows indicate our proposed relationships. As outlined in section 3, we assume that the endogenous latent variable financial stability (η_1) is affected by four exogenous latent variables regulatory governance (ξ_1), structure of the banking sector (ξ_2), macroeconomic conditions (ξ_3) and economic freedom (ξ_4). Thus, we will consider four sets of indicator variables. This is broadly consistent with recent policy and academic work on the determinants of financial stability (see, e.g., Kaminsky and Reinhart, 1999; Lindgren et al.,1999; Breuer, 2004; Barth et al., 2006; Laeven and Valencia, 2008; Reinhart and Rogoff, 2009; Frankel and Saravelos, 2010).

Figure 1. The structural equation model



In view of the various indicator variables presented in section 3, a range of model specifications has been tested. We start from the most general specification and omit variables by applying an iterative procedure. The choice of variables is based on several criteria: the statistical significance of the estimated parameters, the parsimony of the model and the goodness-of-fit measures that will be discussed in

more detail below. Nevertheless, given the vast number of possible specifications we have to exercise some judgment in order to achieve a parsimonious and reasonable model.[4] To achieve identification, it is required to normalize one of the indicator variables of each latent variable (see Bollen, 1989; Kline, 2011). We impose a factor loading of unity on foreign competition, political central bank independence, inflation, control of corruption, and the ratio of capital to assets.

5 Results

The main results and the goodness-of-fit statistics are shown in table A.3 in the appendix. Most of the maximum likelihood estimated coefficients are statistically significant and have the anticipated sign. The results are consistent across all model specifications (1) to (5). Specification (1) is our benchmark model with the best model fit (see figure A.2 in the appendix).[5]

Most importantly, the results indicate that regulatory governance has a positive influence on the stability of the banking sector. This relationship is robust and positive throughout all model specifications. Thus, regulatory agencies that are characterized by a higher degree of independence and accountability tend to contribute to a more stable banking sector. This finding is in line with previous studies such as Beck et al. (2003), Das et al. (2004) and Ponce (2009).

Turning to the other latent variables, we find a positive relationship between the structure of the banking sector and banking sector stability. As expected, more open and less restricted banking systems increase the safety and soundness of the banking system. Furthermore, the results indicate that adverse macroeconomic conditions have a negative influence on banking sector stability. Thus, confirming the findings of other empirical studies, symptoms of an unstable, adverse macroeconomic environment such as rising inflations rates, a higher volatility of output growth or rising real interest rates, seem to have a negative impact on financial stability.

Perhaps surprisingly, economic freedom seems to have a negative effect on the stability of the banking sector. To be sure, greater freedoms might imply that banks engage in activities that carry higher risks. Thus, the institutional environment may induce greater risk-taking and distort the incentive structure in the banking sector so that the banking stability may be undermined (see Beck et al., 2007 for a similar line of reasoning). Although one should be careful when interpreting this result, it is in line with findings of previous studies. Firstly, there seems to be no evidence that higher compliance with governance standards lead to a better performance during the recent financial crisis – whether on a corporate level (Beltratti and Stulz, 2009) or in terms of country governance (Giannone et al., 2010). To the contrary, more freedoms seemed to lead to higher risk taking. Secondly, Breuer (2006) finds that a lack of property rights reduces the level of non-performing loans which might be explained by the fact that countries lacking property rights exhibit less recognition of non-performing loans. Thirdly, Hasan et al. (2008) find that rule of law is negatively correlated with profit efficiency in the banking sector since banks may be incentivised to invest less resources in collecting proprietary information which in turn results in sub-optimal lending decisions. And lastly, Rodrik (2006) argues that empirical evidence has not been able to establish a robust causal link between any institutional feature and economic growth. He refers to the Chinese experience which demonstrates that common goals can be achieved under divergent rules.

We also report goodness-of-fit statistics. The most common test is the chi-square test. We start by reporting the ratio of chi-square to degrees of freedom (CMIN/DF). Since values of CMIN/DF $\leq$ 2.5 indicate a good model fit, all model specifications are accepted. However, the chi-square test has the weakness that it accepts every model if the sample size becomes sufficiently small (Blunch, 2008). Accordingly, we resort to further fit measures. The Comparative Fit Index (CFI) is a relative fit measure which takes values between 0 and 1; a CFI value $\geq$ 0.9 is considered as a good fit. The CFI is larger than 0.9 in all models (except (5)), thus indicating a good fit throughout the model specifications (Bentler, 1990). A fit measure based on the non-central chi-square distribution that provides us with evidence of an acceptable fit is the Root Mean Square Error of Approximation (RMSEA).[6] The RMSEA value in our benchmark model is 0.61, indicating an acceptable fit; the RMSEA in the other specification is larger but still acceptable.

Regarding the fit measures based on statistical information theory, we report the Akaike Information Criterion (AIC), the Browne-Cudeck Criterion (BCC) and the Bayes Information Criterion (BIC). These fit measures are typically employed for comparing different model specifications and provide the researcher with information for the model selection, where models with values closer to zero indicate better fit, greater parsimony and accordingly the (likely) best model (see Hair et al., 2006; Blunch,

[4] The studies of, e.g., Dell'Anno et al. (2007) and Dreher et al. (2007) follow a similar procedure.

[5] We experimented with a wide array of different model specifications. Specifications different from those in section 5 were estimated, but mainly led to a worsened model fit, as will be discussed in more detail below. To conserve space and to improve comprehensibility, not all specifications considered in the empirical analysis are reported but are available on request.

[6] Following Browne and Cudeck (1993), a RMSEA $\leq$ 0.05 reflects a good model fit, values less than 0.08 indicate an acceptable fit and values from 0.08 to 0.1 a mediocre fit. Models with RMSEA values larger than 0.1 should be discarded.

2008). As can be seen in table A.3 in the appendix, the best fitting and most parsimonious model is specification (3). Nevertheless, we chose model (1) as our benchmark model since it displays the lowest RMSEA value and largest CFI value, respectively.[7]

Turning to the relationships between latent and indicator variables, tables A.4 to A.8 in the appendix display the results. Most of the maximum likelihood estimated coefficients are statistically significant and have the anticipated sign. The results are fairly consistent across all model specifications.

We find a positive relationship between regulatory governance (*reggov*) and the variables indicating the degree of independence and accountability of regulatory authorities as well as the indices that proxy the strength of external audit and political independence of central banks. The last finding points to a more active role for central banks in the banking regulation process. The variable for the economic independence is statistically insignificant (not reported). Furthermore, the results show a positive relationship between the structure of the banking sector (*bankstruc*) and the variables representing bank concentration, private ownership of banks and foreign bank competition. As anticipated, the restrictiveness of bank activities enters with a negative sign. We find a negative relationship between the macroeconomic conditions (*macrocond*) and our inflation indicator, the real interest rate as well as deposit rate and GDP growth volatility. With respect to indicator variables not contained in the benchmark model we obtain negative signs for the deposit rates and GDP growth and a positive sign for fiscal balance (not reported) and the Chinn-Ito index measuring financial openness. Considering credit and money growth, it turns out that the coefficients' sign is negative (not reported). Both variables were omitted in the iterative process; while credit growth enters statistically insignificant, the model fit worsens considerably when adding money growth. Regarding economic freedom (*ecofree*), the results show that the governance indicators control of corruption, rule of law and government effectiveness enter with a positive sign. The other governance indicators not reported are also positively associated with economic freedom. Furthermore, more democratic and parliamentary systems indicate greater economic freedoms and an increasing government size is negatively related to economic freedom, while the coefficient for the deposit insurance scheme enters insignificantly. Finally, we find a negative relationship between economic freedom and executive election.[8]

With regard to the financial soundness indicators (FSIs), we find a positive relationship between financial stability and all FSIs (we inverted the values of the NPLs ratio).[9] It should be noted that we omit the indicator variables Bank provisions to non-performing loans (*provtonpl*) and Non-performing loans to total loans (*npltotloan*) from early on in the iterative model selection process. Although they both show the expected sign (not reported), they are rendered insignificant or worsen the model fit. This may be attributed to the fact that the statistics regarding the non-performing loans in a banking sector may suffer from measurement problems which are likely to increase the noise in the data analyzed since national regulatory authorities still often follow national guidelines that are not necessarily aligned (see Cihák and Schaeck, 2010). Interestingly, the proxy most often utilized for capturing financial (in)stability in the empirical literature is the ratio of nonperforming loans to total loans.

Since this empirical exercise is of exploratory nature, we qualify our results along three dimensions. First, while we acknowledge that the country sample might seem quite heterogeneous at first sight, this selection is based on two broader goals: (i) data constraints aside, we aimed for a well-balanced country sample that includes advanced, transition and developing countries and is well diversified from a geographical point of view; and (ii) the ultimate goal was to extend the scope of the sample. It is precisely for the latter reason, that we did not group the sample into subsets to achieve a higher degree of representativeness on an individual country basis. As noted by Quintyn (2007), an important issue in building up evidence on regulatory governance is using extended data sets, since the samples used by past studies were too small, which had an impact on the robustness of the results.

Second, the flexibility offered by SEM does not make it easier to estimate (latent) variables that are difficult to measure. Thus, the construction of reliable models for the estimation of such variables is not a straightforward process (see also Bajada and Schneider, 2005 on this point).

Finally, on a more general note, one could evaluate the issue of regulatory governance by employing different empirical methods such as principal components. Basically, principal component analysis (PCA) is recommended for finding patterns in data of high dimension. While cogent arguments for PCA might be put forward, results critically depend on the scaling of the variables – a limitation not applying to SEM. More generally, SEM seems to be the

[7] Note that we also employed the information-theoretic criteria in the iterative model selection process that led us to the omission of discarded models that are not reported in this paper.

[8] A newly elected executive may bring profound political change associated with increasing uncertainty among market participants. A new executive could enforce significant modifications to regulatory or economic policies that constrain economic freedoms and entail negative outcomes for the financial sector or the economy in general.

[9] We experimented with different measures of financial stability from different sources. When using return on equity (*roe*) data from the World Banks' World Development Indicators (WDI), the model fit increases dramatically. For reasons of brevity, we only report the results using the WDI for return on equity.

appropriate statistical technique for our research goal of investigating the statistical relationship between regulatory governance and financial stability, which cannot themselves be directly measured or are difficult to measure. The fact that there are multiple indicators of financial stability and regulatory governance makes the SEM approach a better methodology for estimating the effects of regulatory governance on financial stability.The relationship between these latent variables can be simultaneously estimated within the structural model, while the indicators can be linked with the latent variable in the measurement models, thereby extracting information from different dimensions of financial stability and regulatory governance respectively.

6 Conclusion

In this paper, we examined whether good regulatory governance promotes a sound and stable financial sector. We employed a structural equation modeling approach to test for the relationship between regulatory governance and financial stability. Our empirical approach enables us to account for a broad range of variables potentially relevant to financial stability, employing aggregate regulatory, banking and financial, macroeconomic and institutional environment data. It allows for a number of indicators reflecting different dimensions of multidimensional variables such as financial stability or regulatory governance, providing better estimation results.

We find that regulatory governance contributes to a sound banking sector. Thus, our results suggest that the performance of bank regulation could be improved by providing the regulatory authorities with a sufficient degree of independence and accountability so that these can effectively fulfill their financial stability mandate. This is consistent with the "private interest view" to bank regulation (Barth et al., 2006) which emphasizes that regulatory authorities should be shielded from pressures from the financial sector as well as political interference.

Furthermore, financial stability depends critically on the structure of the banking sector as well as the macroeconomic and institutional conditions. Our findings indicate that a more open and less restricted banking sector is associated with an increased soundness of the banking system, while macroeconomic disturbances are negatively related to banking sector stability. Economic freedom seems to have a negative effect on the stability of the banking sector. Hence, an institutional environment that implies greater freedoms may entail higher risk-taking and a distorted incentive structure that undermines banking stability.

Our results support important policy implications. Policymakers should provide a high degree of independence to regulatory authorities so that these are able to resist political interference or the influence of financial industry lobbies. The regulatory authority should be in the position to independently exercise its judgment and powers in regulatory and supervisory activities but independence should also be reflected in the appointment and dismissal of senior staff, stable sources of agency funding, and adequate legal protection for the agencies' staff. Of equal importance, regulatory authorities have to be accountable to the executive/legislative and the financial industry, to provide public oversight, maintain legitimacy and enhance integrity. As the IMF's assessments have shown, the strengthening of regulatory governance is indeed one of the themes most in need of improvement (Vinals et al., 2010). Thus, the improvement of regulatory governance arrangements should be a building block of financial reform since the current international regulatory framework lacks the ability to guard bank regulators from being influenced by the financial sector as well as political interference, and governance failures have been a key contributory factor to the recent financial crisis.

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Appendix

Table A.1. Data Sources and Definitions

Variables	Definition/Description	Source
Financial Stability (*finstab*)		
Regulatory capital to risk-weighted assets	Measures capital adequacy of deposit takers, capital adequacy ultimately determines the degree of robustness of financial institutions to withstand shocks to their balance sheets.	IMF, Global Financial Stability Report
Bank capital to assets	Indicates extent to which assets are funded by other than own funds and is a measure of capital adequacy of the deposit-taking sector, measures financial leverage and is sometimes called the leverage ratio	IMF, Global Financial Stability Report
Bank provisions to non-performing loans (NPLs)	This is a capital adequacy ratio; important indicator of the capacity of bank capital to withstand losses from NPLs	IMF, Global Financial Stability Report
Return on assets	Net income before extraordinary items and taxes/average value of total assets, indicator of bank profitability and is intended to measure deposit takers' efficiency in using their assets	IMF, Global Financial Stability Report; World Bank, World Development Indicators
Return on equity	Net income before extraordinary items and taxes/average value of capital, bank profitability indicator, intended to measure deposit takers' efficiency in using their capital	IMF, Global Financial Stability Report; World Bank, World Development Indicators
Non-performing loans to total loans	Proxy for asset quality, intended to identify problems with asset quality in the loan portfolio	IMF, Global Financial Stability Report
Regulatory Governance (*reggov*)		
Supervisory independence	Index, degree of independence of supervisor	Masciandaro et al. (2008)
Supervisory accountability	Index, degree of accountability of supervisor	Masciandaro et al. (2008)
Political central bank independence	Index, degree of independence of central bank	Arnone et al. (2009)
Economic central bank independence	Index, degree of independence of central bank	Arnone et al. (2009)
Supervisory independence and accountability	Index based on questions taken from Barth et al. (2006): 12.2.1, 12.2.2, 12.2.3, 12.2, 11.7.1, 5.5; if yes=1, otherwise=0; 12.10.; if yes=0, otherwise=1; sum of assigned values, higher values indicate higher independence and accountability	Barth et al. (2006)
Strength of external audit	Index based on questions taken from Barth et al. (2006): 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7; yes=1, no=0; sum of assigned values, higher values indicate better strength of external audit	Barth et al. (2006)

Table A.1. Data Sources and Definitions (continuation)

Variables	Definition/Description	Source
Macroeconomic Conditions (macrocond)		
Fiscal balance	Budget balance, % of GDP	ICRG, PRS Group
GDP growth volatility	Std. deviation of growth rate (annual % change)	World Bank, WDI
GDP growth	Avrg. annual growth in GDP (annual % change)	World Bank, WDI
Credit growth	Year-on-year growth of domestic credit to private sector (% of GDP)	World Bank, WDI
Money growth	Avrg. annual growth of money supply in the last 5 yrs. minus avrg. annual growth of real GDP in last 10 yrs.	Economic Freedom of the World Database
Inflation	GDP deflator	IMF, WEO
Real interest rate	Annual % change	World Bank, WDI
Financial openness	Index measuring de jure-openness	Chinn/Ito (2008)
Deposit rate volatility	Std. deviation of a country's deposit rate	World Bank, WDI
Banking System Structure (*bankstruc*)		
Government ownership	Share of bank deposits held in privately owned banks	Economic Freedom of the World Database
Foreign bank competition	Foreign share of the banking sector assets and the degree of foreign bank entry	Economic Freedom of the World Database
Bank concentration	Three largest banks' assets/total banking sector assets	World Bank, Fin. Structure + Development Database
Restrictiveness of bank activities	Index based on questions taken from Barth et al. (2006): 4.1, 4.2, 4.3; 1=unrestricted, 2=permitted, 3=restricted, 4=prohibited; sum of assigned values, higher values indicate greater restrictiveness	Barth et al. (2006)
Economic Freedom (*ecofree*)		
Deposit insurance scheme	Dummy variable (1/0): is there an explicit deposit insurance system?	World Bank, Deposit Insurance Database
Government effectiveness	Quality of public services, quality of the civil service, degree of its independence from political pressures, quality of policy formulation and implementation	World Bank, World Governance Indicators
Control of corruption	Extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests	World Bank, World Governance Indicators
Voice and accountability	Extent to which a country's citizens are able to participate in selecting their government, freedom of expression, freedom of association, and a free media	World Bank, World Governance Indicators
Regulatory quality	Ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	World Bank, World Governance Indicators

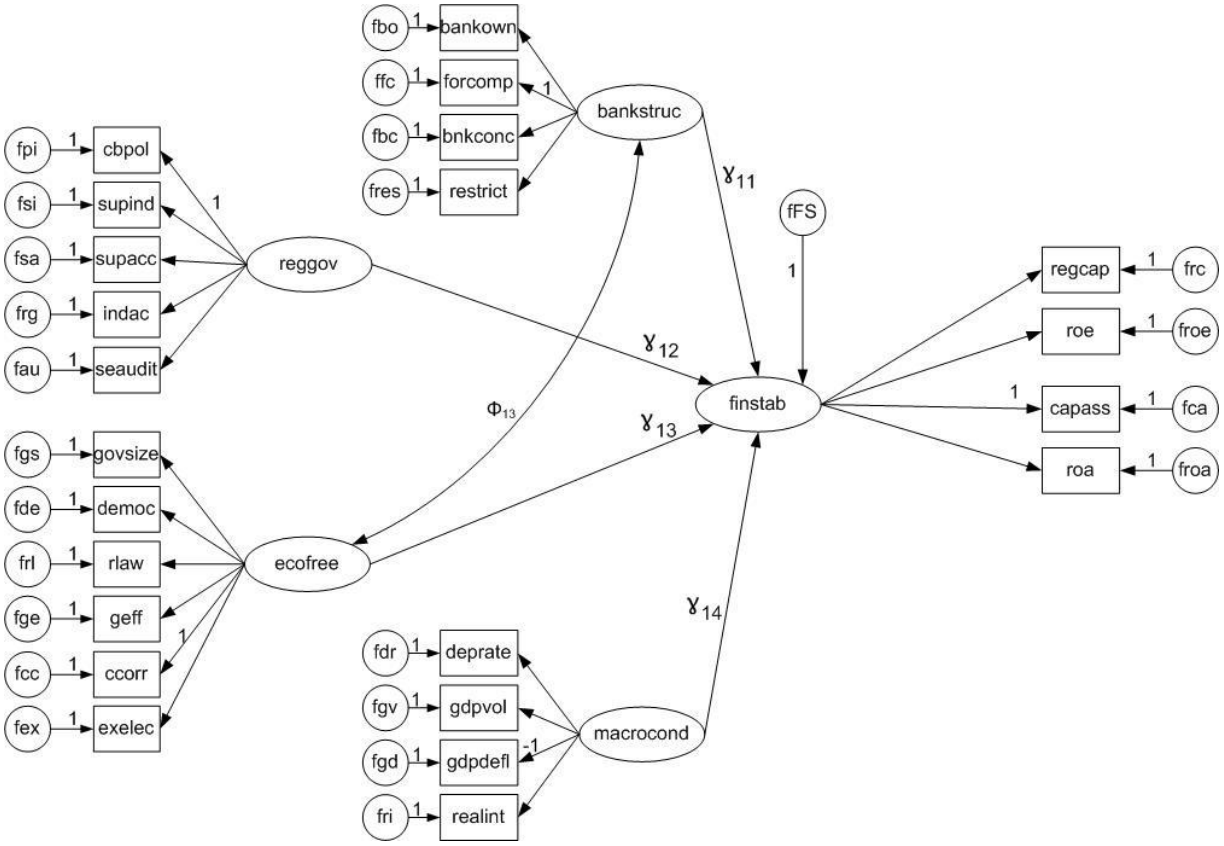
Table A.1. Data Sources and Definitions (continuation)

Variables	Definition/Description	Source
Rule of law	Extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts	World Bank, World Governance Indicators
Political stability	Likelihood that the government will be destabilized or overthrown by unconstitutional or violent means	World Bank, World Governance Indicators
Democracy	10-category scale (1-7) with a higher score indicating more democracy	Polity IV Data Set
Government size	General government final consumption expenditure (% of GDP)	Economic Freedom of the World Database
System	Presidential (0), assembly-elected presidential (1), parliamentary (2)	World Bank, Database of Political Institutions
Exelec	Indicating whether there was an executive election in a certain year	World Bank, Database of Political Institutions

Table A.2. List of Countries (World Bank Classification)

Income group	Country name
High income	Australia, Austria, Bahamas, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom
Upper middle income	Chile, Czech Rep., Estonia, Hungary, Latvia, Mauritius, Mexico, Poland, Trinidad & Tobago
Lower middle income	Armenia, Brazil, Bulgaria, China, Colombia, Ecuador, Egypt, El Salvador, Guatemala, Morocco, Nicaragua, Peru, Philippines, South Africa, Sri Lanka, Tunisia, Turkey
Low income	India, Indonesia, Nigeria, Uganda, Zambia

Figure A.2. Path diagram of benchmark model



Note: We include a two-headed correlation arrow between the latent variables "structure of the banking sector" and "economic freedom". In the course of our iterative model selection process we tested for various correlations between the latent variables; by including this correlation arrow, we achieved the best model fit.

Table A.3. Estimation Results (Latent Variables) and Goodness of Fit

Specification	(1)	(2)	(3)	(4)	(5)
Latent Variables					
Regulatory Governance → Financial Stability	0.24*	0.234*	0.239*	0.203*	0.237*
	(0.057)	(0.053)	(0.057)	(0.078)	(0.054)
Banking Sector Structure → Financial Stability	0.596**	0.533**	0.554**	0.65***	0.556**
	(0.011)	(0.014)	(0.014)	(0.009)	(0.014)
Macroeconomic Conditions → Financial Stability	-0.109***	-0.147***	-0.157**	-0.157**	-0.17***
	(0.004)	(0.000)	(0.011)	(0.019)	(0.004)
Economic Freedom → Financial Stability	-0.144***	-0.118***	-0.139***	-0.147***	-0.129***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Banking Sector Structure ↔ Economic Freedom	0.167***	0.169***	0.169***	0.166***	0.168***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CMIN/DF	1.202	1.302	1.268	1.304	1.416
CFI	0.933	0.903	0.917	0.905	0.861
RMSEA	0.061	0.075	0.07	0.075	0.088
AIC	372.348	394.989	356.747	363.984	386.901
BCC	453.948	476.589	429.456	436.694	459.611
BIC	474.722	497.363	455.106	462.344	485.26

Note: P-values in parenthesis. Significance at 10% level (*), at 5% level (**), at 1% level (***).

Table A.4. Estimation Results, Indicator Variables Regulatory Governance

Specification	(1)	(2)	(3)	(4)	(5)
Latent Variable	Regulatory Governance				
Indicator Variables					
Supervisory Independence and Accountability	0.082**	0.081**	0.083**	0.078**	0.081**
	(0.033)	(0.032)	(0.031)	(0.03)	(0.03)
Strength of External Audit	0.495*	0.495*	0.497*	0.469*	0.486*
	(0.064)	(0.063)	(0.064)	(0.062)	(0.063)
Supervisory Independence	0.385**	0.081**	0.379**	0.324**	0.361**
	(0.015)	(0.014)	(0.014)	(0.012)	(0.013)
Supervisory Accountability	0.104*	0.101*	0.104*	0.108*	0.104*
	(0.086)	(0.09)	(0.086)	(0.063)	(0.079)
Political Central Bank Autonomy	1	1	1	1	1

Note: P-values in parenthesis. Significance at 10% level (*), at 5% level (**), at 1% level (***).

Table A.5. Estimation Results, Indicator Variables Structure of the Banking Sector

Specification	(1)	(2)	(3)	(4)	(5)
Latent Variable	Structure of Banking Sector				
Indicator Variables					
Bank Concentration	0.269***	0.266***	0.266***	0.279***	0.271***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Foreign Ownership	1	1	1	1	1
Ownership of Banks	0.906***	0.895***	0.888***	0.911***	0.896***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Restrictiveness of Bank Activities	-0.281***	-0.277***	-0.28***	-0.278***	-0.282***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Note: P-values in parenthesis. Significance at 10% level (*), at 5% level (**), at 1% level (***).

Table A.6. Estimation Results, Indicator Variables Macroeconomic Conditions

Specification	(1)	(2)	(3)	(4)	(5)
Latent Variable	Macroeconomic Conditions				
Indicator Variables					
Inflation	-1	-1	-1	-1	-1
Real Interest Rate	-0.021***	-0.019***	-0.026**	-0.018*	-0.023**
	(0.002)	(0.003)	(0.014)	(0.054)	(0.011)
GDP Growth		-0.299***			
		(0.001)			
GDP Growth Volatility	-0.246*		-0.431**	-0.408**	-0.419**
	(0.073)		(0.038)	(0.042)	(0.021)
Deposit Rate	-0.151***	-0.119***			
	(0.000)	(0.000)			
Deposit Rate Volatility			-0.58***		-0.466***
			(0.006)		(0.003)
Financial Openness				0.641**	0.443*
				(0.037)	(0.084)

Note: P-values in parenthesis. Significance at 10% level (*), at 5% level (**), at 1% level (***).

Table A.7. Estimation Results, Indicator Variables Economic Freedom

Specification	(1)	(2)	(3)	(4)	(5)
Latent Variable	Economic Freedom				
Indicator Variables					
Government Effectiveness	0.892***	0.892***	0.892***	0.892***	0.89***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Rule of Law	0.903***	0.903***	0.903***	0.903***	0.902***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Control of Corruption	1	1	1	1	1
Deposit Insurance Scheme					0.046
					(0.369)
Government Size	-0.031***	-0.031***	-0.031***	-0.031***	
	(0.000)	(0.000)	(0.000)	(0.000)	
Democracy	0.249***	0.249***	0.249***	0.249***	
	(0.000)	(0.000)	(0.000)	(0.000)	
Executive Election	-0.226***	-0.226***			
	(0.000)	(0.000)			

Note: P-values in parenthesis. Significance at 10% level (*), at 5% level (**), at 1% level (***).

Table A.8. Estimation Results, Indicator Variables Financial Stability

Specification	(1)	(2)	(3)	(4)	(5)
Latent Variable	Financial Stability				
Indicator Variables					
Regulatory capital/risk-weighted assets	0.539***	0.558***	0.53***	0.538***	0.532***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Capital to assets ratio	1	1	1	1	1
Return on assets	0.825***	0.871***	0.792***	0.834***	0.797***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Return on equity	0.138**	0.147**	0.13*	0.137**	0.131*
	(0.044)	(0.041)	(0.055)	(0.046)	(0.056)

Note: P-values in parenthesis. Significance at 10% level (*), at 5% level (**), at 1% level (***).